

Stackable Radiation Hardened FRAM, Phase I

Completed Technology Project (2007 - 2007)



Project Introduction

Satellite and space systems designers of long duration lunar and planetary missions continue to find it difficult to provide the ever increasing amount of memory considering the impact on platform size and weight. Under SBIR contract NNG04CA25C NxGen Electronics Inc has developed a radiation hardened Ferro Electric Random Access (FRAM) memory which will have 2Mb density and radiation characteristics useful for many satellite and space applications. The design and building of prototype chips is being completed under this contract. However, funding was insufficient for full radiation characterization. In addition, feedback from potential customers, including JPL and other prime contractors, indicates that even more density would be useful in the same footprint. NxGen has been developing rugged, high reliability, light weight 3D memory stacking technology which would improve the density over a monolithic package by a factor of 8. Although other technologies, such as MRAM, are being developed with the promise of high density, our understanding is that NASA/JPL would find the FRAM technology superior from a number of perspectives including density, performance and cost. Under sub-topic O1.05, Reconfigurable & Reprogrammable Communications Systems, sub-sub-topic, "Component Technology", we believe this proposal qualifies as novel advancement in memory density.

Anticipated Benefits

Potential NASA Commercial Applications: The market for radiation hardened and tolerant components beyond NASA would include European Space Agency and Japanese Space Agency as available markets. Both countries have space programs which could benefit from the proposed developments such as Aurora and BepiColombo at ESA and Lunar missions at NASDA. In the past we have found that acceptance of new technology by NASA has been a prerequisite in these two countries. Marketing efforts would be expanded internationally as a secondary activity to satisfying NASA/JPL requirements.



Stackable Radiation Hardened
FRAM, Phase I

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Organizational Responsibility	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

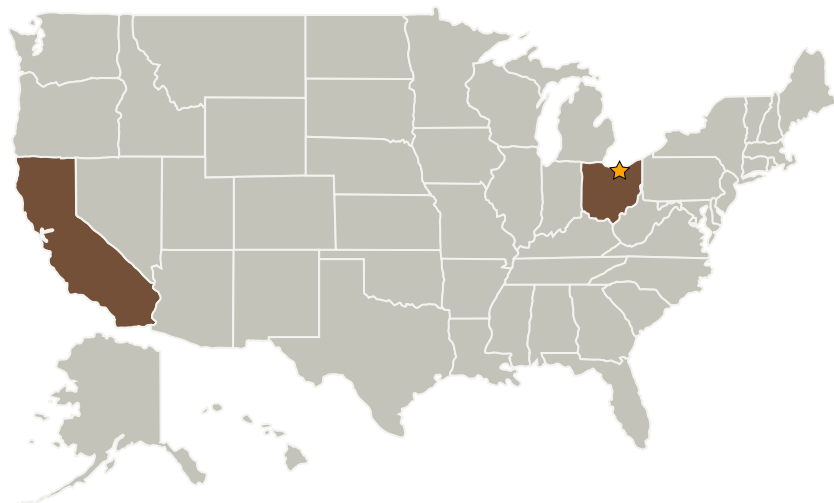
Small Business Innovation Research/Small Business Tech Transfer

Stackable Radiation Hardened FRAM, Phase I

Completed Technology Project (2007 - 2007)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
NxGen Electronics, Inc.	Supporting Organization	Industry	San Diego, California

Primary U.S. Work Locations

California	Ohio
------------	------

Project Transitions

**January 2007:** Project Start**July 2007:** Closed out

Closeout Summary: Stackable Radiation Hardened FRAM, Phase I Project Image

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Donald Hayashigawa

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.1 Avionics Component Technologies
 - └ TX02.1.2 Electronic Packaging and Implementations